posed of zero to six bits. L is composed of one to eight bits. S is composed of one bit. the run data is dependent upon scanning position. and the level is dependent upon quantizer.

Therefore. since the modified escape sequence has a variable length ranging from eight to 21 bits. compared to the fixed length of 21 bits. image data can be further compressed.

In decoding the new escape sequence. since the respective current scanning positions are automatically matched for the coding system and decoding system. the number of bits required for expressing the run value can be matched without transmitting extra information. Also. in the case of the level length. since the quantization step size is transmitted to the decoding system for inverse quantization. the transmitted quantization step size can be used in synchronizing the number of bits required for expressing level. which requires no extra information to be transmitted.

The above-described variable-length coding and decoding methods which improve compression efficiency by adjusting the length of the escape sequence variably are disclosed in the U.S. pat. application Ser. No. 08/069.914 filed on Jun. 1. 1993 by the assignee of the present invention.

According to the present invention. a plurality of variable-length tables are provided for both the coding and decoding sides. which may be slightly more complex in hardware. compared to the case of using a conventional single table. However. the present invention is adopted for the case when a high data compression rate is necessary. Also. the corresponding mode. quantization step size and scanning position information generated in coding side is transmitted to the decoding side. The mode and quantization step size information is transmitted in a constant period of time or is transmitted whenever there is a change. The scanning position information is not transmitted separately but is obtained automatically by accumulating the run values after obtaining [run. level] values of the decoding side.

Therefore. although the information on the selected variable-length coding table is not transmitted separately with respect to the block data transmitted to the decoding side. the variable-length coding table selected during coding can be identified from the mode and quantization step size information transmitted from the coding side and the position information automatically calculated from the run value in the decoding side. Then. the same variable-length coding table as that adopted for coding is used for decoding the transmitted block data.

As described above. the method according to the present invention can increase data compression efficiency such that image data coded and decoded by selecting one of a plurality of variable-length coding tables having a regular region and an escape region. using mode. quantization step size and zigzag scanning position information.

Also. according to the present invention. no extra bit which expresses the variable-length coding table selected during coding is necessary to be transmitted for decoding. The transmission data can be further compressed by adjusting variably the run and level lengths of the data to be coded in the escape region of the selected variable-length coding table.

Industrial Applicability

An adaptive variable-length coding/decoding method according to the present invention can improve the compression efficiency of digitally transmitted data and is applicable to various technological fields including digital communication. multimedia and personal computer systems. and digital video apparatuses such as a high definition television or digital videocassette recorder.

What is claimed is:

1. An adaptive variable-length coding method whereby quantized orthogonal transform coefficients are scanned in a

zigzag pattern, are modified into run, level data and then are variable-length coded in a coding system for image data, said method comprising the steps of:

5   setting a plurality of variable-length coding tables having different patterns of a regular region and an escape region according to statistical characteristics of said run, level data;

    selecting one of said plurality of variable-length coding
10   tables according to intra/inter mode information of the currently processed block, zigzag scanning position and quantization step size; and

    variable-length coding the orthogonal transform coefficients according to said selected variable-length coding
15   table, wherein said selecting step has the selecting range of a plurality of variable-length coding tables having different patterns of a regular region and an escape region according to said intra/inter mode information of the currently Processed block.

20   [2. The adaptive variable-length coding method as claimed in claim 1, wherein said variable-length coding table is selected in accordance with said zigzag scanning position and quantization step size within the range determined by the corresponding mode.]

25   [3. The adaptive variable-length coding method as claimed in claim 1, wherein data of said escape region of said variable-length coding table selected in said variable-length-coding step is coded into data having variable run-length and level-length.]

30   4. An adaptive variable-length decoding method for decoding the data coded by said adaptive variable-length coding method as claimed in claim 1, in a decoding system for image data, said decoding method comprises the steps of:

    setting a plurality of variable-length decoding tables hav-
35   ing different patterns of a regular region and an escape region according to statistical characteristics of the run, level data;

    inputting intra/inter mode information transmitted from said coding system;

40   inputting quantization step size transmitted from said coding system;

    detecting position information while zigzag-scanning by accumulating run values of run, level data;

45   selecting one of said plurality of variable-length coding tables according to said intra/inter mode information, quantization step size and position information; and

    variable-length decoding the data received according to said selected variable-length coding table.

50   5. The adaptive variable-length decoding method as claimed in claim 4, wherein said variable-length decoding table selecting step has the selection range of a plurality of variable-length coding tables having different patterns of a regular region and an escape region according to said intra/inter mode information of the currently processed
55 block in said mode information inputting step.

  6. The adaptive variable-length decoding method as claimed in claim 5, wherein said variable-length decoding table is selected in accordance with said zigzag scanning position and quantization step size within the range deter-
60 mined by the corresponding mode.

  7. The adaptive variable-length decoding method as claimed in claim 4, wherein data of said escape region of said variable-length decoding table selected in said variable-length-decoding step is decoded into run, level data corre-
65 sponding to variable run-length and level-length.

* * * * *

8. An adaptive variable-length coding method in which quantized orthogonal transform coefficients are scanned in a predetermined pattern, and then are variable-length coded in a coding system for image data, said method comprising the steps of:

setting a plurality of variable-length coding tables;

selecting one of said plurality of variable-length coding tables according to intra/inter mode information, and scanning position and quantization step size, wherein said selecting step has the selecting range of a plurality of variable-length coding tables; and

variable-length coding said quantized orthogonal transform coefficients according to said selected variable-length coding table.

9. The adaptive variable-length coding method of claim 8, wherein said variable-length coding tables have different patterns of a regular region and an escape region.

10. The adaptive variable-length coding method as claimed in claim 9, wherein said variable-length coding table is selected in accordance with said scanning position and quantization step size within the range determined in accordance with said intra/inter mode information.

11. The adaptive variable-length coding method as claimed in claim 9, wherein data of said escape region of said variable-length coding table selected in said variable-length-coding step is coded into data having variable run-length and level-length.

12. An adaptive variable-length decoding method for decoding the data coded by an adaptive variable-length coding method, in a decoding system for image data, said decoding method comprising the steps of:

receiving intra/inter mode information;

receiving quantization step size;

detecting position information;

selecting one of a plurality of variable-length decoding tables according to said intra/inter mode information, quantization step size and position information; and

variable-length decoding the data received according to said selected variable-length coding table.

13. The adaptive variable-length decoding method of claim 12, wherein said detecting position information step is performed by in accordance with run, level data.

14. The adaptive variable-length decoding method as claimed in claim 13, wherein said variable-length decoding table selecting step has the selection range of a plurality of variable-length decoding tables having different patterns of a regular region and an escape region according to said intra/inter mode information of the currently processed block in said mode information inputting step.

16. **15.** The adaptive variable-length decoding method as claimed in claim 14, wherein said variable-length decoding table is selected in accordance with said zigzag scanning position and quantization step size within the range determined in accordance with said intra/inter mode information.

9. **16.** The adaptive variable-length decoding method as claimed in claim 15, wherein data of said escape region of said variable-length decoding table selected in said variable-length decoding step is decoded into run, level data corresponding to variable run-length and level-length.

10. **17.** The adaptive variable-length decoding method of claim 16, wherein said detecting position information step is performed by accumulating the number positions indicated by a run value and level data.